

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problems Mailbox.**

This Page Blank (uspto)

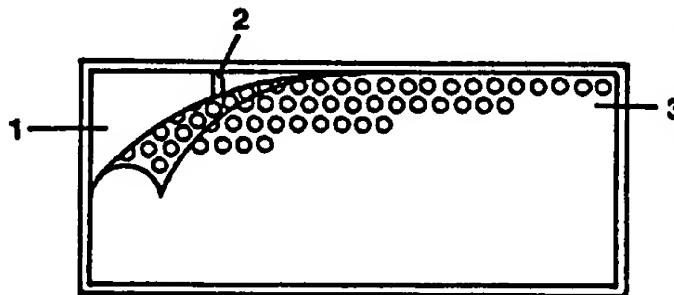
PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: B05D 1/12, B60J 3/00, G02B 27/00	A1	(11) International Publication Number: WO 95/23034 (43) International Publication Date: 31 August 1995 (31.08.95)
(21) International Application Number: PCT/US95/02483 (22) International Filing Date: 27 February 1995 (27.02.95) (30) Priority Data: 08/203,181 28 February 1994 (28.02.94) US (71) Applicant: CREATIVE MINDS FOUNDATION [US/US]; 2316 Baynard Boulevard, Wilmington, DE 19802 (US). (71)(72) Applicant and Inventor: SPILFELDS, Rodney, M. [US/US]; 1139 Sierra Vista Way, Lafayette, CA 94549 (US). (74) Agent: CLEAR FOCUS IMAGING, INC.; Suite 105, 575 West College Avenue, Santa Rosa, CA 95401 (US).	(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ, UG). Published <i>With international search report.</i>	

(54) Title: WINDOW PAINTING APPARATUS AND METHOD**(57) Abstract**

An improved display product and method of making a display wherein a perforated panel (3) is provided with layers of paint which are kept on the panel (3). Thus, a sign painter can have a wide latitude of designs which can be applied to see-through graphics. The resulting product can be opaque to an observer looking from one side of a display product, yet the observer is able to see through the product from the other side of the product. A window to be provided with a display



product is masked with masking paper (1) and masking tape (2) to cover the exposed parts. A perforated panel (3) is cut to fit the window and attached over the masking paper (1) and the masking tape (2). The perforated panel (3) is painted with an image that is desired.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

WINDOW PAINTING APPARATUS AND METHOD

5

This invention relates to techniques for the painting of transparent panels, such as windows, which permits messages, signs, and other such displays to be affixed to and displayed on such panels while permitting the passage in one direction but not in the opposite direction of visible light through light passages.

10

BACKGROUND OF THE INVENTION

15

20

25

In the practice of window painting for advertising or promotional purposes, it is desirable to create as large and eye-catching a display as possible. Generally, however, a display across a window will block any light which would otherwise come through the window. Thus, this light cannot add to the interior lighting requirement of the structure or store having the window. Additionally, in such structures as banks where security is of importance, not being able to see out through the windows can present serious security problems. Security can be important to the safety and well-being of the bank customers and employees.

30

35

Painted window graphics is one of the largest segments in the sign painting industry. They can be seen practically everywhere - at banks, restaurants, and retail stores. Yet, traditional painted window graphics look untidy from a location inside of the window, as well as blocking natural light into and through the store window and out of the window. Typically, from the reverse side of an image on the graphics, the appearance of the image looks poorly and can be a great distraction, and this is a well-known objection to the use of such images upon window surfaces.

- 2 -

Hill, U.S. Patent 4,673,609, discloses a method of painting one-way graphics onto windows by the use of a mask applied to the window where paint goes through the holes to adhere directly to the glass. There are many problems associated with this method.

1. If the mask does not adhere properly, the paint will bleed under the mask and create unsightly irregular or ragged patterns of dots.

2. Removal of the mask may remove portions of the color or lift entire dots from the surface of the glass.

3. Removal of the graphics from the glass is labor intensive, requiring the use of aggressive window cleaning techniques including scraping the paint from the window, the use of cleaning agents, or the use of high pressure sprays.

4. During the removal of painted graphics from the surface of the glass, the washed off or scraped off paint particles can stain the surrounding areas such as window frames or sills, wall areas, landscaping and walkways.

5. Multiple coats of paint are required to achieve one way graphics; first a black or dark coat is applied and then after the black coat has dried, then at least one coat of the background color is required to cover the black coating.

6. One way graphics painted directly onto glass require a significant investment of time both in the application of several coats of paint and in the labor-intensive removal methods required.

It could be well if the use of such images did not block the light or the view that is the intended

- 3 -

function of the window, because the benefit of such images would be great.

The display product and method of this invention seeks to solve these problems.

5

SUMMARY OF THE INVENTION

The present invention is directed to an improved display product and method of making the display wherein a perforated panel is provided with layers of paint which are kept on the perforated panel. Thus, depending upon the type of display which is desired, the sign painter using the teachings of the present invention can have a wide latitude of designs which can be applied to see-through graphics. The resulting product can be substantially opaque to an observer looking from one side of a display product yet the observer is able to see through the product from the other side of the product itself.

For the sign painter who wants quality and durability with the ability to create see-through graphics, the preferred embodiment is a superior display product for hand painted one-way graphics. An image is painted onto a perforated panel, and then the panel is applied to window surfaces. This allows durable and high quality paints to be used for longer term graphics displays, compared to traditional painted window graphics.

The preferred embodiment is for use on masked windows since it has a perforated liner that could allow the paint to go through the liner. For unmasked windows, or for applications where it is desired to do the painting in locations other than the site of the installation, a different version could have an additional liner which would prevent the paint from bleeding through.

- 4 -

In the preferred embodiment of the present invention, a window to be provided with a display product is masked with masking paper and masking tape to cover the exposed parts. A perforated panel is cut to fit the window and attached over the masking paper and the masking tape. The perforated panel is painted with an image that is desired. Once the painting is completed, the panel is taken away from the masking paper, and the masking paper and the masking tape are removed and discarded. The painted panel with the one or more layers of paint thereon is applied to the window which was previously covered by the masking tape and the masking paper. The perforated panel could have an adhesive coating that would have a protective backing liner to protect the adhesive. This liner is peeled off when as the perforated panel is peeled or separated from the backing masking paper and masking tape, thus, leaving the holes of the perforated panel free as well as holes in the painted liner.

Once the perforated panel with paint thereon is applied to the window, the assembly of panel and paint layers is complete and an observer looking in the direction of the panel will see through the panels without seeing the paint layer and the observer looking at the paint layer from a distance will not see the interior of the space or the opposite side of the panel from the window side.

Typically, the perforated panel is applied by an adhesive to the masking paper but it also can be applied by other methods, such as tape, double-stick tape, sprayed adhesive, suction cups and the like. The perforated panel can be backed by a non-perforated backing layer either with or without an adhesive layer therebetween. Such removable backing liner would

- 5 -

eliminate the need for masking of the windows in many installations.

The primary object of the present invention is designed to provide an improved painted display product and method of making the product wherein a perforate panel is used to form a display product on a glass surface or window and in which the display product is possible due to the placement of the perforate panel on the window. Thus the observer can view the image from one side of the window surface, but not from the other side, all of which gives wider latitude to the formation of designs on window surfaces in an efficient, economical manner.

Other objects of this invention will become apparent as the following specification progresses, reference being had to the accompanying drawings for an illustration of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side elevational view of a window to be provided with the design of the present invention covered by masking paper and tape;

Fig. 2 is a view similar to Fig. 1 but showing a perforated panel applied over masking tape and masking paper on the window;

Fig. 3 is a view of the window with the perforated panel mounted on the masking tape and masking paper applied to the window surface, and a paint layer applied to the perforated panel and to areas around the window;

Fig. 4 is a view similar to Fig. 3 but showing the masking paper and masking tape to which are applied the dots of paint passing through the holes of the perforated panel, the result being observed when the

panel and tape layer are peeled off the masking tape and masking paper;

5 Fig. 5 shows the window after the masking paper and masking tape have been removed, portions of the image not on the window remaining;

Fig. 6 is a view similar to Fig. 4 but showing the painted panel 8 installed on the window surface with the remaining image portions aligned with the surrounding graphics;

10 Fig. 7 shows a fragmentary perspective view of the assembly of layers capable of holding the design of the present invention;

Fig. 8 is a view similar to Fig. 7 but showing a slightly modified form from that shown in Fig. 7;

15 Fig. 9 is a view similar to Figs. 7 and 8 but showing black adhesive backing for the stack of the present invention; and

20 Figs. 10, 11 and 12 are vertical sections through the panel assemblies of Figs. 7, 8 and 9, respectively.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

25 In a preferred embodiment of the invention denoted by the numeral 10 having clear glass panes or window 12 (Fig. 1) is provided with a masking tape 2 around the exposed window hardware and a masking paper sheet 1 is applied to the window on one surface thereof.

30 A perforated panel 3 is shown in Fig. 2 as applied to and fitted with the window on one side of the transparent or translucent pane or surface thereof. The perforated panel 3 is cut to fit the window. Panel 3 is hung in place with double-stick tape strips, the attachment being in covering relationship to the masking paper 1 and the masking tape 2.

The outer surface of the panel 3 is painted with an image denoted by the numeral 4 (Fig. 3) as desired. In applications where the window will have the graphics to match the image around the window on large continuous graphics, for example, the entire scene can be painted at one time including the masked windows covering the perforated panels. The numeral 5 shows portions of the image that extend onto the surrounding surfaces of the structure that supports the window. Since the same paint is used on the assembly and the rest of the site to be painted, and the painting is all done at one time, there will be little noticeable difference between a portion of the image on the panel and the rest of the graphic, yet persons on the inside of the window can still see out through the window to the outside of the building or structure which the window forms a part.

Once the painting layer has completely dried, the panel 3 is separated from and taken off the masking paper and masking tape. Then, after the masking paper and masking tape have been taken off the window surface, they are discarded as they are no longer needed to carry out the teachings of the present invention. Fig. 4 shows a portion of the paint dots on a masking paper and masking tape but this is not the image which is desired. The desired image is painted on the outer surface of the perforated panel 3 (Fig. 6) and this panel has been separated from the masking paper 1 and a masking tape 2.

Fig. 5 shows the windows from which the masking paper 1 and the masking tape 2 have been removed. The end portions of the image not on the window remain on the panel.

After the masking paper and masking tape have been removed from the window, the perforated panel with the layers of paint forming the image on the panel are applied to the window surface as shown in Fig. 6, and the

5 holes in the perforated panel allow the observer to see through the panel from one side of the window but an observer can only see the image in the form of the paint layers when looking at the window from the other side of the window.

10 The panel could have an adhesive coating that would have a protective backing liner to protect the adhesive until ready for use. The assembly could be done either before or after the perforation of the panel. To install the painted panel in this configuration, the backing liner of the assembly is first removed to expose the adhesive backing; then, the image on the assembly is aligned with the surrounding graphics and the assembly is smoothed out onto the surface of the window, thus
15 attaching the perforated panel and the image to the window surface. Another possibility of the installation would be to affix the perforated panel to the glass window surface in some other method such as by an adhesive or tape, a double-stick tape, spray adhesive,
20 suction cups and the like.

The panel can be backed with a non-perforate backing either with or without the adhesive layer in a protective backing liner which could or would eliminate the need for the masking of the windows in many
25 installations.

Fig. 7 shows a cross-sectional view of an embodiment with a non-perforated backing paper. This configuration uses transparent materials which could be affixed to the glass and is provided for configurations which could be used for applications where the image
30 would be viewed through the glass panel. The panel on which the image is to be painted or printed, broadly denoted by the numeral 52, is transparent and is backed with a transparent adhesive layer 53 which could also be

an electrostatically charged surface as in static cling plastic materials.

5 The adhesive layer 53 is protected by a removable backing liner 55. These three elements, namely panel 52, clear adhesive 53, and backing liner 55 could form an assembly of layers which could be perforated with holes 49 together. The assembly of these three layers would then be bonded or laminated onto a backing material 61 by an adhesive 73. The adhesive as shown is applied to the backing and then the assembly 55 and 73 is laminated to the assembly of layers 52, 53 and 55. The adhesive could be applied to the back of the removably backing liner to adhere the backing material 73 to the assemblies 52, 53 and 55. Layers 52 and 53 can be backed with a non-perforated removable backing layer 61.

15 It is only necessary that the panel which is to be painted or printed upon, namely panel 52, be perforated. All other elements except the backing material 73 can be perforated or not as desired.

20 Fig. 8 shows perspective views of an embodiment wherein the image can be visible over the surface of the glass. The panel 80 on which the image is to be painted or printed is opaque material. Panel 80 is backed with a dark colored adhesive 82. The adhesive layer 82 is protected by a removable backing layer 83. These three elements, namely elements 80, 82 and 83 could form an assembly which permits the elements to be perforated together. The assembly of layers 80, 82 and 83 would then be bonded to or laminated to a backing material 85 by an adhesive 84. The adhesive as shown is applied to the backing liner 85 and then the assembly of layers 84 and 85 is laminated to the assembly layers 80, 82 and 83. The adhesive would be applied to the back of the layer 83 to adhere the backing material layer 85 to the exposed assembly of layers 80, 82 and 83. Layers 80 and 82 could

be backed with a non-perforated removable backing layer 85.

5 It is only necessary that the panel which is to be painted or printed upon, namely panel 80, be perforated. All of the other elements, except the printed material at layer 85 can be perforated or not, as desired. The backing should be solid for most applications.

10 Fig. 9 shows a view similar to Figs. 7 and 8 in which the opaque panel 90 has a dark colored layer 91 with an adhesive 92 which could also be an electrostatically charged film as in static cling plastic materials, a transparent adhesive or a dark colored adhesive. The adhesive layer 95 is protected by a
15 removable backing liner 93. These four elements could form an assembly which could be perforated together. The assembly of elements 90, 91, 92 and 93, would then be bonded or laminated to a backing material 95 by an adhesive 90. The adhesive is applied to the backing and
20 then the assembly 94 and 95 is laminated by the assembly of 90, 91 and 92. The adhesive could be applied to the back of the removable liner 93 to adhere the backing material 95 to the assembly 90, 91 and 92. Layers 90, 91 and 92 could be backed with a non-perforated removable
25 backing layer 95.

It is only necessary that panel 90 which is to be painted or printed upon be perforated. All the other elements except the backing material 95 can be perforated or not, as desired. The backing material should be solid
30 for most applications.

In Figs. 10-12, the image 99 is viewable from the left in Fig. 10 and from the right in Figs. 11 and 12. Figs. 10, 11 and 12 show the addition of a
35 semitransparent material 98 such as a partially tinted film or metalized film commonly known as one-way mirror

- 11 -

5 film or window tinting. The addition of this semitransparent material allows the one-way printing effect to compensate for different light levels and would offer a greater degree of "one-way vision", which would have many applications in the field of security or surveillance. Figs. 10, 11 and 12 also show the panels adhered to a window material such as glass or plastic 96, after the backing materials have been removed and discarded.

WHAT IS CLAIMED IS:

1 1. A display panel assembly for a transparent
2 window comprising:

3 a perforated panel having a pair of opposed
4 faces, one of said faces adapted to be contiguous to a
5 surface on the window; and

6 at least one layer of paint on at least a
7 portion of one face of the panel.

1 2. An assembly as set forth in Claim 1,
2 wherein is provided a masking sheet for removable
3 application to the window, said masking sheet defining
4 said surface on the window, said panel being removably
5 affixed to the masking sheet to couple the panel to the
6 window.

1 3. An assembly as set forth in Claim 1,
2 wherein the layer of paint and the panel have holes
3 therethrough.

1 4. An assembly as set forth in Claim 1,
2 wherein is included an adhesive layer on a face of the
3 panel, there being a protective liner covering the
4 adhesive layer thereon.

1 5. An assembly for attachment to a window to
2 provide an image therefore removable from one side only
3 of the pane comprising:

4 a perforated panel having a pair of opposed
5 faces, one of the faces having at least one layer of
6 paint defining an image applied to at least one portion
7 of the panel, said panel having a plurality of holes
8 therethrough, said holes extending through the layer of
9 paint whereby an observer on one side of the window can

10 view the image without being able to observe the scene on
11 the opposite side of the window, an observer on the
12 opposite side of the window pane being able to view
13 through the panel and the layer of paint by way of the
14 holes without viewing the image.

1 6. An assembly as set forth in Claim 5,
2 wherein is included a masking sheet for covering the
3 window, said masking sheet having an outer face against
4 which the inner face of the panel is applied, whereby the
5 paint layer can be applied to the panel and the paint can
6 pass through the holes onto the masking sheet, the
7 masking sheet being removable from the window and the
8 panel after the paint layer has been applied thereto.

1 7. A method of forming a window display
2 comprising:
3 providing a perforate panel having a plurality
4 of holes therethrough;
5 placing the panel against a blocking surface;
6 painting the panel so that the paint entering
7 the holes will be applied to the blocking surface
8 adjacent to the window surface;
9 allowing the paint to dry;
10 removing the panel, leaving the paint in the
11 form of dots on the blocking surface;
12 removing the blocking surface; and
13 applying the panel against the window.

1 8. A method as set forth in Claim 7, wherein
2 the blocking surface is a masking sheet applied to the
3 window.

1 9. A window painting method comprised of an
2 panel attaching a panel to a transparent or translucent

3 surface, said panel having a quantity of holes
4 therethrough;
5 applying a light reflective coating to the
6 panel and to the surface through the holes;
7 removing the assembly to leave a portion of the
8 light reflective coating upon the surface, whereby an
9 image can then projected by movie, slide or video
10 projection on the portions of the light reflective
11 coating remaining upon the surface.

1 10. A window painting method comprising:
2 providing an assembly consisting of a panel and
3 a transparent, semitransparent or translucent film, the
4 panel having a plurality of holes through it, and said
5 film being contiguous to the panel;
6 applying the assembly to a window surface, and
7 applying an image to the assembly and to the film through
8 the holes; and
9 removing the panel and leaving a portion of the
10 image upon the film which remains attached to the window
11 surface.

1 11. A method as set forth in Claim 10, where
2 the film has one way optical properties.

1 12. A window painting method comprising:
2 providing an assembly of a panel attached to a
3 transparent or translucent film, the panel having a
4 number of holes through it, where a light reflective
5 coating is applied to the assembly and is also applied to
6 the film through the holes;
7 applying the assembly to a window surface and
8 then removing the panel, leaving a portion or portions of
9 the light reflecting coating upon the surface, projecting
10 an image by a movie, slide or video projection on the

- 15 -

11 portions of the light reflective coating remaining upon
12 the surface.

1 13. A perforated assembly laminated onto a
2 masking sheet as in Claim 12 which is printed upon prior
3 to installation, using multiple colors.

1 14. An assembly as in Claim 12 wherein guides
2 or outlines are printed onto the assembly to guide or
3 assist the artist.

1 15. A window painting method comprising:
2 providing an assembly of panels with one of the
3 panels having a number of holes therethrough;
4 applying a light reflective coating to the
5 assembly, removing the assembly, leaving a portion of the
6 light reflecting coating upon the surface; and
7 projecting an image onto portions of the light
8 reflective coating remaining on the surface.

1 16. A window painting method comprising:
2 an assembly of panels attached to a
3 transparent, semi-transparent or translucent film, such
4 panel having a plurality of holes therethrough, said film
5 being contiguous to the panel, applying an assembly to
6 the window, and applying an image to the assembly, said
7 image being applied to the film through the holes, after
8 the image is applied to the assembly, the panel is
9 removed while leaving a portion or portions of its image
10 upon the film which remains attached to the window
11 surface.

1 17. A method as set forth in Claim 10, wherein
2 the film has one-way optical properties.

1 18. A window painting method comprising:
2 providing an assembly of panels with one of the
3 panels having a translucent or transparent film thereon,
4 said one panel having a number of holes therethrough
5 whereby a light reflective coating is applied to the
6 assembly and is also applied to the film through the
7 holes; and
8 removing the panel after the light reflective
9 material is applied thereto.

1 19. In a window painting method as set forth
2 in Claim 12, wherein said perforated material is printed
3 on prior to installation using one or more colors.

1 20. An assembly as set forth in Claim 12,
2 wherein guides or outlines are printed on the surface to
3 guide or assist the artist.

1 / 6

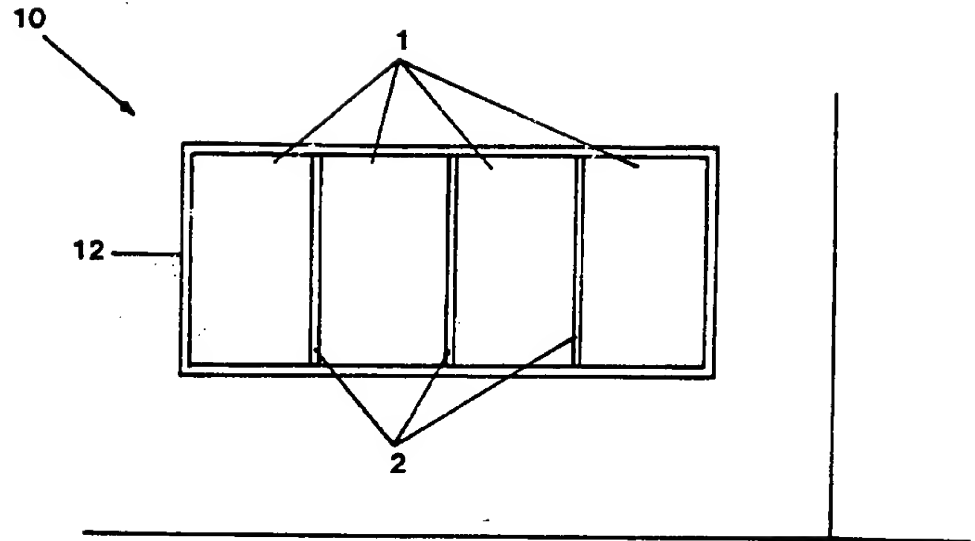


FIG. 1

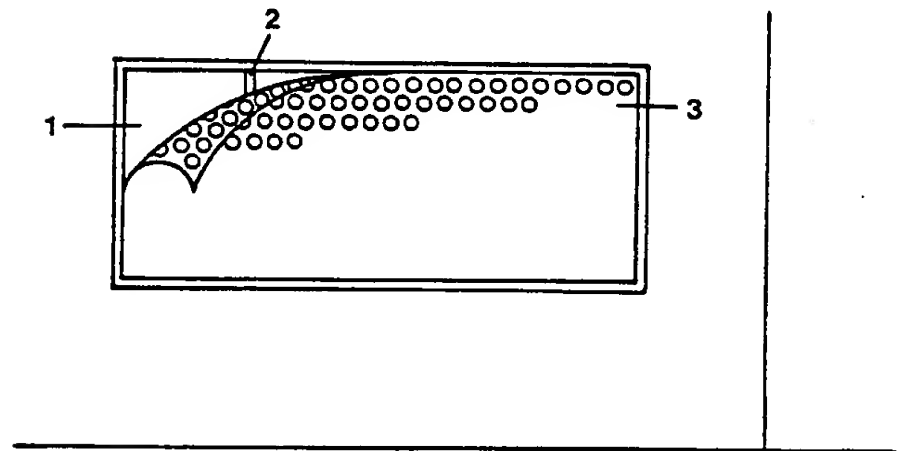


FIG. 2

2 / 6



FIG. 3

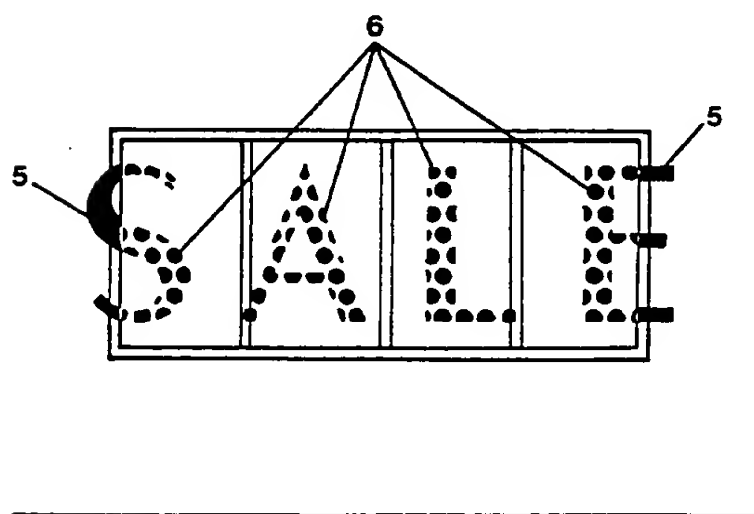


FIG. 4

3 / 6

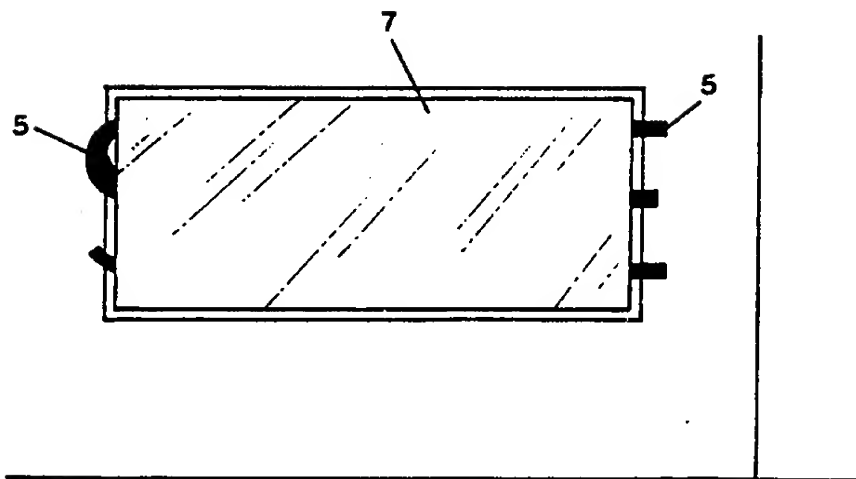


FIG. 5

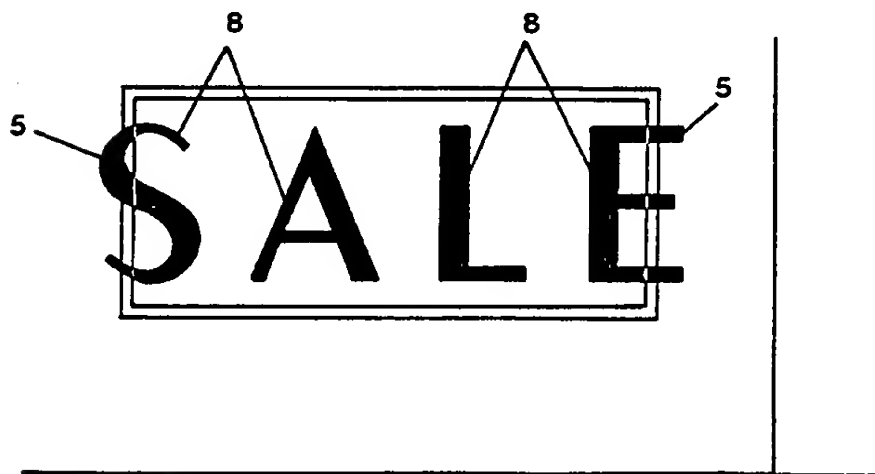


FIG. 6

RECTIFIED SHEET (RULE 91)

4 / 6

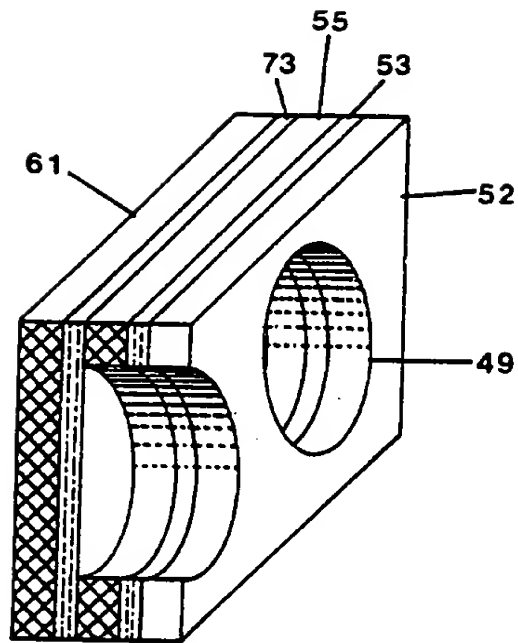


FIG. 7

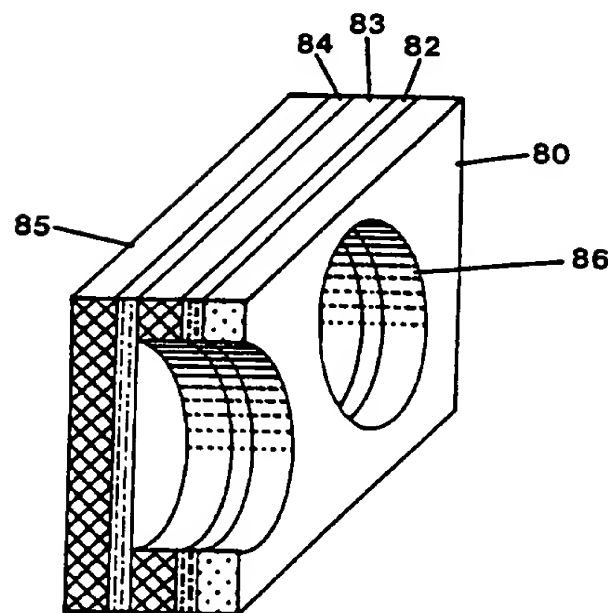


FIG. 8

5 / 6

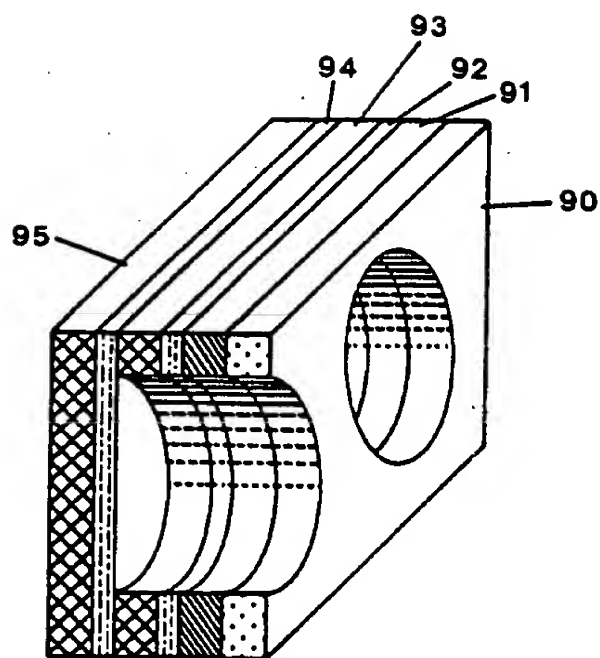


FIG. 9

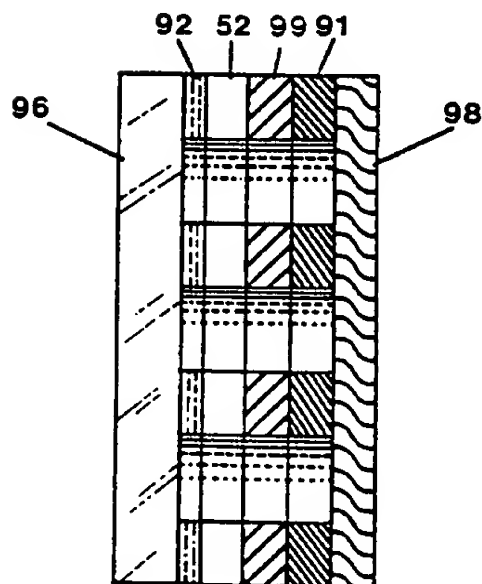


FIG. 10

RECTIFIED SHEET (RULE 91)

6 / 6

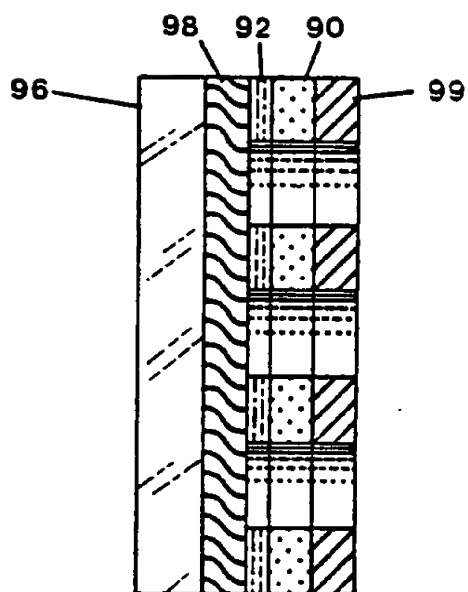


FIG. 11

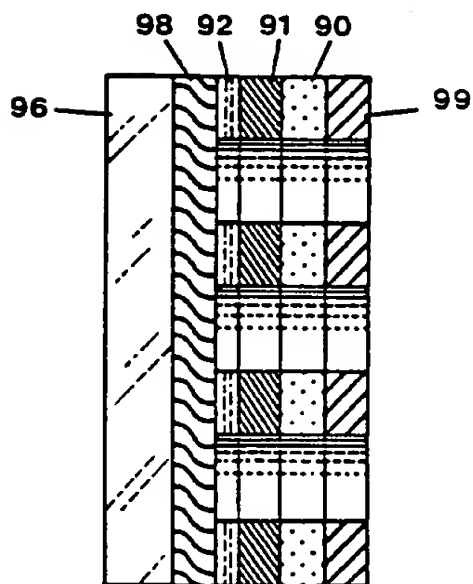


FIG. 12

RECTIFIED SHEET (RULE 91)

INTERNATIONAL SEARCH REPORT

 International application No.
 PCT/US95/02483

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : B05D 1/12; B60J 3/00; G02B 27/00

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELD SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

 U.S. : 42 187, 191, 137, 138, 195, 202, 203, 204, 31; 40/219, 593; 52/105, 171.1; 296/97.2, 97.3, 97.6; 427/266, 269,
 272 282, 283, 372.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X -- Y	US, A, 4,358,488 (DUNKLIN ET AL.) 09 November 1982, See abstract, figures 1, 3 and 4; column 3, lines 46-62.	1-3, 5-6, 9-12, 15-19 ----- 4, 13, 14, 20
X -- Y	US, A, 4,673,609 (HILL) 16 June 1987, See abstract, columns 9 and 10.	7, 8 ----- 4, 13, 14, 20
A	US, A, 4,070,781 (SAUER) 31 January 1978, See abstract, and drawing.	1

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

* Special categories of cited documents:

A documents defining the general state of the art which is not considered to be part of particular relevance

E earlier document published on or after the international filing date

L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)

O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

A

document member of the same patent family

Date of the actual completion of the international search

11 APRIL 1995

Date of mailing of the international search report

24 APR 1995

 Name and mailing address of the ISA/US
 Commissioner of Patents and Trademarks
 Box PCT
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

NASSER AHMAD

Telephone No. (703) 308-2351

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/02483

A. CLASSIFICATION OF SUBJECT MATTER: US CL :

428/40, 187, 131, 137, 138, 195, 202, 203, 204, 31; 40/219, 593; 52/105, 171.1; 296/97.2, 97.3, 97.6; 427/266, 269,
272, 282, 287, 372.2